

## EARTH EXCAVATION/BACKFILL

### ITEM 120

#### PART 1 - GENERAL

WORK INCLUDED: (Sec. 01) Perform all earth excavations, backfill and related work for pipe lines, manholes and/or structures as indicated on the Drawings and specified.

RELATED WORK: (Sec. 02) Furnished/paid for in respective Item: (as applicable)

Removal Trees/Stumps (over 8" diameter)  
Rock Excavation/Backfill  
Foundation Cushion  
Granular Backfill  
Bulk Concrete

DESCRIPTION: (Sec. 03) All materials encountered below the ground surface, natural and/or manmade, including removal and disposal of pavement and sidewalk, except Rock Excavation and Backfill, Item 125, are included in this Item.

Pipe line - Clear construction area of topsoil, brush, shrubs, stumps and trees less than eight inches in diameter.

Structures - Clear construction area of topsoil, brush, shrubs, stumps, trees and debris, unless included for payment elsewhere.

Excavate, by open cut method, and backfill as required for the proper construction/installation of the proposed work.

REFERENCES: (Sec. 04)

ASTM D698 -	Moisture Density Relations of Soils and Soil - Aggregate Mixtures
D1556 -	Density of Soil in Place by the Sand-Cone Method
D4253, D4254 -	Relative Density of Cohesion less Soils

SUBMITTAL: (Sec. 05) Three copies of compaction testing records, if compaction testing specified.

SITE CONDITIONS: (Sec.06) Elevations of existing ground are believed to be reasonably accurate but are not purported to be absolutely so. Contractor shall satisfy self if more accurate information desired.

PAYMENT: (Sec. 07) Payment shall be made as shown in the Bid Documents if not included with another Item.

#### PART 2 - PRODUCTS

MATERIALS: (Sec. 08) Excavated earthen materials, when specifically directed to be used, shall

be clean and free of foreign and organic material and contain no rocks larger than three inches.

### PART 3 - EXECUTION

INSPECTION: (Sec. 09) Inspect site and determine conditions that may effect the proper execution of the work.

Soil data in the Specifications or indicated on the Drawings, if any, may be supplemented with own investigation to determine soil conditions that will be encountered.

INSTALLATION/APPLICATION: (Sec. 10)

#### Pipeline Evacuation/Backfill

Limit length of trench opened at any one time to that length required for efficient construction and public convenience. No more than 50 feet of trench shall be opened in advance of the completed work. Do not open new trenches when completed trenches need backfilling or labor is required to restore driving or walking surfaces to a safe condition.

If safety cages are used, the bottom of the safety cage shall at all times be above the top of the pipe in order not to disturb the pipe bedding or pipe line when the cage is moved forward.

Excavation limits shall not exceed those indicated on the Drawings, except as noted herein.

Additional authorized foundation material, Foundation Cushion or Bulk Concrete, required to fill over-excavated areas shall be paid for in the applicable item stipulated in the proposal, if unit price Contract.

Additional Authorized Excavation: If materials encountered at bearing depth are not suitable for support, or it is necessary to increase the excavation limits, additional excavation outside the original excavation limits may be authorized by the Resident Representative and paid for in Item 120.

Unauthorized Excavation: Excavation carried outside the authorized excavation limits, and all excavation or other work resulting from slides, cave-ins, swells or upheaval, which is made without authorization of the Resident Representative, shall be at the Contractor's expense. Unauthorized excavations shall be refilled with compacted Foundation Cushion or Bulk Concrete if directed by the Resident Representative, at no cost to the Owner.

Storage of Excavated Materials: If conditions permit, excavated material may be stored along the line of work. If streets and roads where traffic conditions make it necessary to keep open as much of the roadway as possible, immediate backfill of the excavation shall be required after pipeline construction, with no storage of excavated material along the line of work permitted. Do not obstruct walkways, driveways, emergency equipment or utility controls with stored material. Maintain natural and man-made drainage free of obstruction or provide adequate temporary drainage.

Temporary Backfill: If the excavation is left open for an unreasonable length of time, as determined by the Owner, Contractor shall refill such excavation and place temporary paving in walkways and roadways at his own expense. Temporary backfill and paving shall remain in place until construction is ready to proceed.

Backfilling: Backfill trenches below pavements, drives, curbs, gutters, walks and berms, or as directed by Resident Representative, as specified and paid for in Item 164, Granular Backfill, if unit price Contract.

If stated on drawings, in Special Provisions, or ordered by the Owner, suitable excavated earthen materials may be saved as backfill in lieu of Granular Backfill at no additional cost.

Jetting of trenches containing Granular Backfill is permitted in lieu of mechanical compaction.

Jetting of Trenches shall be completed as soon as practical after backfilling. An injection pipe under water pressure shall be injected into backfill to within one foot of pipe bedding, or structure footing, and maintained until backfill refuses water. Injection pipe to be then moved to the next location. Maximum spaces between jetting penetration shall be four foot staggered centers. Holes left by removing injection pipe shall be flushed full with granular material.

Mechanical compaction or jetting of backfill outside the limits of pavements, berms, curb/gutters and walks is not required, unless indicated on Drawings, except as follows:

Within the Right-of-Way limits of state and/or federal highways, compact to 90 percent of maximum dry density.

Earth backfill shall be temporarily mounded over the trench to allow for settlement. Contractor shall maintain trenches and backfill to provide natural or man made drainage free of obstructions. Ponding of water shall not be permitted. Adequate temporary drainage shall be provided by the Contractor. Prior to final grading and seeding, all excess materials over trenches shall be removed and the work areas restored to original contours, or as indicated on the Drawings.

Earth backfill material shall be furnished and placed at no additional cost.

#### Structure Excavation and Backfill

Excavation: Unless noted otherwise on the Drawings, place foundation of structure directly on undisturbed soil; final trimming of the bottom of the excavation shall be done just prior to placing forms and/or reinforcing steel. Excavation dimensions shall be no greater than necessary for building the structure, supporting the walls of the excavation and accommodating the necessary dewatering equipment.

Excavation Limits: Dimensions shall not exceed those indicated on the Drawings, except as noted herein.

Additional Authorized Excavation: If the materials encountered at bearing depth are not suitable for support, additional excavation may be authorized by the Resident Representative. Additional authorized concrete, foundation materials, and excavation outside the excavation limits shall be paid for in the applicable Item stipulated in the proposal. If lump sum contract, price for additional work shall be determined prior to performing such work.

Unauthorized Excavation: Excavation carried outside the excavation limits indicated on the Drawings, and all excavation or other work resulting from slides, cave-ins, swelling or upheaval, which is made without authorization of the Resident Representative, shall be made at the Contractor's expense. Unauthorized excavation shall be refilled with Foundation Cushion or Bulk Concrete if directed by the Resident Representative, at no cost to the Owner.

Storage for Excavated Materials: Store excavated material suitable for use as backfill material or site fill in a stockpile, the location of which will not place dangerous loadings on the walls of the

excavation. Do not obstruct walkways, driveways, roadways, emergency equipment or utility controls with stored material. Maintain natural and man-made drainage free of obstruction or provide adequate temporary drainage at no additional cost to Owner.

Backfilling: Backfill shall be earth from the excavated stockpile unless otherwise noted on the Drawings. Backfill shall be free of topsoil, foreign and organic material, rocks larger than three inches in any dimensions, and frozen material.

Do not begin backfilling operation until the structure has attained adequate strength and is complete enough to resist without damage the stresses caused by backfilling. It is the Contractor's responsibility to determine the proper time to begin the backfilling operation and to properly brace the structure to prevent damage.

Place backfill and compact as specified under Backfilling, Page 120-3.

ADDITIONAL WORK REQUIRED: (Sec. 11) Perform the following work as required during performance of this Item for both pipe line and structure excavation.

Pavement Removal: Whenever the removal of pavements other than gravel or surface treated types is required, outline the area to be removed with vertical saw kerfs in straight lines to limit breakage.

Excavation and Disposition of Surface Materials: Carefully remove pavement, walkways, topsoil and other surface material, separate and store for future re-use. Any damaged or deficient material, due to Contractor's operations, shall be replaced with new material by the Contractor at no cost to the Owner. Dispose of damaged material off the site. No extra compensation will be allowed for the removal and storage of materials which are to be re-used.

Disposal of Excess Excavated Material: Incorporate suitable excess excavated material as much as possible in grading where directed by the Resident Representative. Haul any excess materials from excavations, not required in, nor suitable for backfill or repaving, to such locations as the Owner may select, provided such haul does not exceed five miles over an approved route. If the Owner does not designate where such surplus materials are to be disposed of, they become the property of the Contractor and he shall dispose of them off the site at his own expense.

The surfaces of all spoil areas shall be left smooth, level, or evenly sloped for proper drainage, and free from stones, rubbish or other debris.

Sheeting and Shoring: It is the Contractor's responsibility to furnish, install and maintain wood sheeting, steel sheet piling, shoring, planking and bracing, whether or not indicated on the Drawings, to prevent earth movement which could damage the construction, adjacent structures and/or property, obstruct surface drainage channels or waterways, or otherwise impair or delay the work or endanger human life. Remove the sheeting, shoring and bracing during the backfilling unless otherwise noted on the Drawings or directed in writing, by the Resident Representative. For unit price proposals when indicated on the Drawings or directed in writing, by the Resident Representative, wood sheeting or steel sheet piling shall be left in place. Payment for such sheeting or piling shall be made under the respective Item. Sheeting, shoring and bracing left in place by the Contractor for his own convenience will be at his expense. All sheeting or piling left in place shall be cut off at least two feet below final finish grade.

Wood sheeting and steel sheet piling to be removed shall not be withdrawn until the backfilling is substantially complete. As backfilling progresses to the elevation of bracing, remove the braces. Take care to prevent movement of the walls of the excavation during withdrawal of sheeting and piling. Immediately fill voids left by sheeting or piling withdrawal by hydraulic flushing of granular material into the voids.

Removal of Water: Water will not be permitted to enter or flow through a pipeline or conduit during installation without written permission of Resident Representative or Owner. Watertight plugs shall be installed at effluent ends of all sanitary sewer lines. Plugs to be removed by Contractor after final testing and acceptance by Owner.

The method of water removal including site dewatering is the Contractor's choice, but the method chosen shall operate adequately to maintain groundwater table one foot below a structure's lowest subgrade or invert of pipe. The method chosen shall provide for the disposal of all water removed from the excavations in a manner which prevents injury or health impairment to the public, damage to public or private property or any portion of the construction completed or in progress. Public inconvenience shall be minimized, payment shall be included with the cost for storm or sanitary pipe, no separate payment will be made for dewatering.

Protection of Existing Facilities: provide temporary support and adequate protection and maintenance of all existing underground and surface structures, pipe lines and utilities encountered during excavation as provided in the General Conditions. Restore all disturbed underground and surface structures, pipelines and utilities to the original condition. Maintain the flow of water or sewage in existing pipes, ditches and channels which are encountered during construction.

Borrow: Additional material used for backfill, grading and embankment which is obtained from within the site shall not be classified as Borrow. For unit price proposals, additional material obtained off the site shall be specified and paid for in Item 150, Borrow.

Traffic Maintenance: Place and maintain temporary pavement surface over excavations made in roadways and driveways in a manner which will eliminate hazards. Provide the Owner and Resident Representative with the name, address and telephone number of the emergency maintenance service. Provide emergency maintenance services 24 hours per day, including weekends and holidays. If the emergency maintenance service cannot be contacted or if repairs are not promptly made, the Owner shall notify the Contractor and will make the necessary repairs at the Contractor's expense. Trench Topping and/or Calcium Chloride, if required, shall be as specified and paid for in their respective Items.

Tunneling: Tunneling in lieu of open cutting for pipe line trenches will be permitted under trees and utility lines for a length not to exceed fifteen feet. If tunneling is substituted for open cut under this Item, measurement shall be made as specified for open cut method.

FIELD QUALITY CONTROL: (Sec. 12) If specifically called for in Special Provisions, standard compaction tests, performed in accordance with chart below, shall be made by a qualified soils technician to assure that the backfill is properly compacted. Copies of all test records shall be given to the Resident Representative.

Earth backfill under pavements, drives, curbs, beams and walks shall be compacted in eight inch layers to not less than the percent of maximum dry density indicated in the following table.

Max. Lab. Dry  
Wt. Pounds per  
Cu. ft

\*\*Up to a level of one  
foot below the bottom  
of the pavement

\*\*Top one foot of  
below bottom of  
pavement

\* 90.0 - 102.9

102

Unsuitable

103 - 109.9	100	102
110 - 119.9	98	100
120 and more	96	98

\* Materials weighing less than 90 lbs./cu. ft are unsuitable.

\*\*Moisture content shall be maintained within a range of plus or minus three percent of optimum.

Moisture-density relations shall be as specified in ASTM Designation D698.

Compaction testing shall be as specified for density of soils in place by sand cone method, ASTM Designation D1556, or an approved equal method.